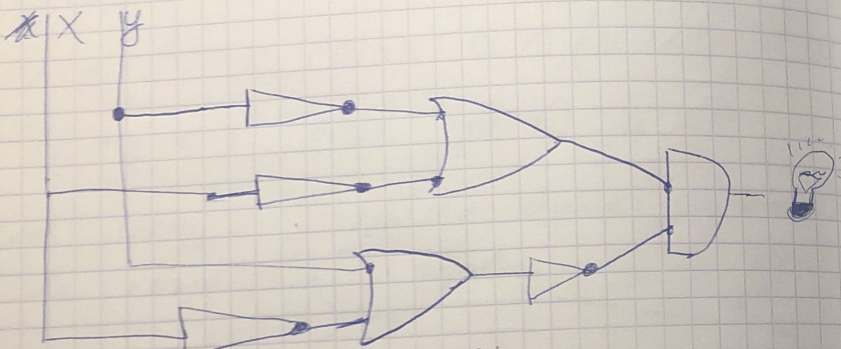


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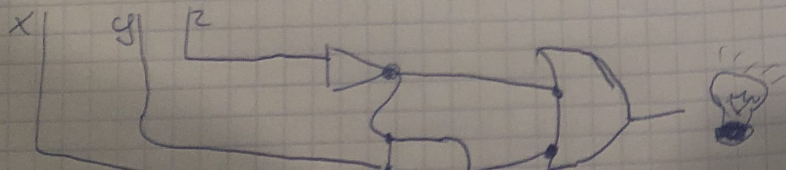
11) a) $F(x,y) = (\sim x \vee \sim y) \wedge \sim(y \vee \sim x)$

| x | y | $\sim x$ | $\sim y$ | $\sim x \vee \sim y$ | $y \vee \sim x$ | $\sim(y \vee \sim x)$ | $F(x,y)$ |
|---|---|----------|----------|----------------------|-----------------|-----------------------|----------|
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |



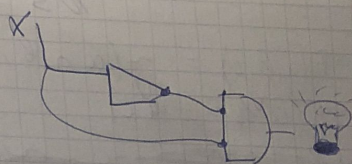
b) $F(x,y,z) = \sim z \vee (x \wedge y \wedge \sim z)$

| x | y | z | $\sim z$ | $(x \wedge y \wedge \sim z)$ | $F(x,y,z)$ |
|---|---|---|----------|------------------------------|------------|
| 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 |



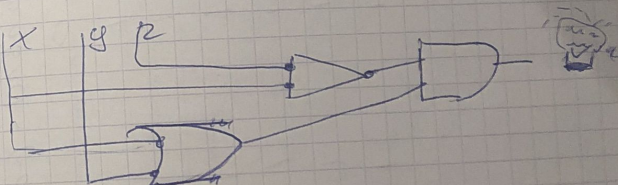
c) $F(x) = \sim x \wedge x$

| x | $\sim x$ | $\sim x \wedge x$ |
|---|----------|-------------------|
| 1 | 0 | 0 |
| 0 | 1 | 0 |

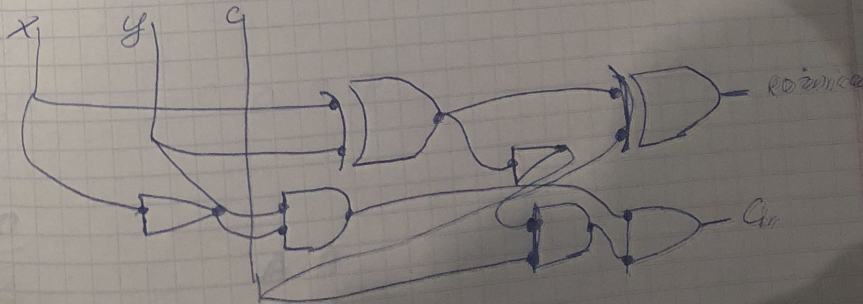


d) $F(x,y,z) = x \vee y \vee (\sim x \wedge \sim z)$

| x | y | z | $\sim x$ | $\sim z$ | $\sim x \wedge \sim z$ | $x \vee y$ | $F(x,y,z)$ |
|---|---|---|----------|----------|------------------------|------------|------------|
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |



12



~~$\neg(a \vee \neg b \vee c)$~~
 ~~$a \vee b \vee c$~~ ~~$\neg(a \wedge b \wedge c)$~~ ~~$(\neg a \wedge \neg b \vee c)$~~ ~~$(a \wedge b \vee c)$~~

| a | b | c | $\neg a$ | $\neg b$ | $\neg c$ | $\neg(a \wedge b \wedge c)$ | $(\neg a \vee \neg b \vee c)$ | $(a \vee b \vee c)$ | $(a \vee \neg c)$ | $(a \vee \neg b \vee c)$ | $(a \wedge b \wedge c)$ |
|---|---|---|----------|----------|----------|-----------------------------|-------------------------------|---------------------|-------------------|--------------------------|-------------------------|
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |

$F(a, b, c) = \neg(a \wedge b \wedge c) \vee (\neg a \vee \neg b \vee c) \vee (a \vee \neg c) \vee (a \vee \neg b \vee c)$